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(54) [TITLE OF THE INVENTION]
OVER CUTTER DEVICE OF SHIELDING EXCAVATION PROPELLING MACHINE
[shield kusshinki no over cutter sochi]

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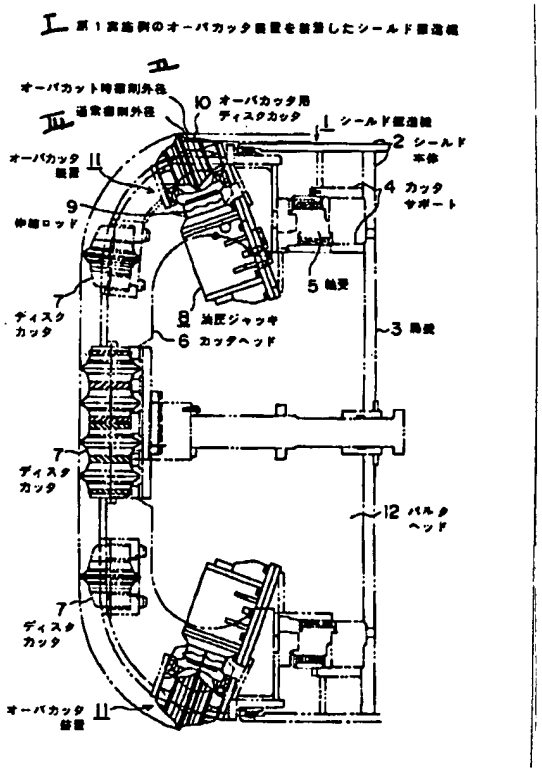
[note: The term that is used in the patent and is coded with (65) could not be found in any dictionaries (civil engineering, construction, mechanical engineering, and others, and therefore, translator provided literal translation of extending portion adjustment mechanism. The term that is used to indicate radial direction in original document does not state radial. It should be noted that the character indicating diameter is used in the original document , and therefore, it should be translated as diametric direction, but as diametric direction does not make sense, and it should be expressed as radial direction rather than diametric, the translator will use the term radial direction rather than diametric direction.]

(57) [ABSTRACT]
[PURPOSE]
To offer an over cutter device that is capable of advancing the over cutter in the radial direction outward of a cutter head to position this at that location during excessive excavation of a tunnel while this is also capable of optionally retracting the over cutter during ordinary excavation.

[CONSTITUTION]
An over cutter device of shielding excavation propelling machine is equipped with a locking mechanisms (23), (29) which either directly supports a disk cutter (10) at top end of an extensible-contractible rod (9) of the jack (8) in possible rotational manner, or positions said disk cutter (10) that is driven toward outside of the cutter head (6) by the jack (8) at that location; and locking measures (22), (34), and (26) of said locking mechanisms (23), (29); and lock release measures (30) ~ (32), (33), and (46) which release that locking.

I: shield excavation propelling machine to which an over cutter device of the first example is attached; II: outer diameter of excavation during the time of over cut, III: outer diameter of ordinary excavation,
1: shield excavation propelling machine, 2: main body of shield, 3: bulkhead , 4: cutter support, 5: bearing, 6: cutter head, 7: disc cutter, 8: hydraulic jack, 9: extensible-contractible rod, 10: disk cutter for over cutter, 11: over cutter device, 12: bulk head



[Amendments: there are no amendments to this patent.]
[note: All names, addresses, company names, and brand names are translated in the most common manner. Japanese language does not have singular or plural words unless otherwise specified with numeral prefix or general form of plurality suffix. Translator's note]

[CLAIMS]

[CLAIM ITEM 1]

According to an over cutter device of shield excavation propelling machine that implements excessive excavation of a tunnel through advancement and retrieval of a disk cutter in the radial direction of the cutter head by a jack that is installed at the position adjacent to outer circumference of said cutter , the over cutter device of shield excavation propelling machine is characterized by the fact that said disk cutter is directly supported in free rotational manner at the top end of an extensible-contractible rod of the jack.

[CLAIM ITEM 2]

The over cutter device of shield excavation propelling machine according to the claim item 1, wherein a baffle mechanism is provided to the jack to which top end, said disk cutter is installed in a free rotational manner.

[CLAIM ITEM 3]

The over cutter device of shield excavation propelling machine according to the claim item 2, wherein said baffle mechanism is arranged inside of the extensible-contractible rod of the jack that supports said disk cutter in a free rotational manner.

[CLAIM ITEM 4]

The over cutter device shield excavation propelling machine according to the claim item 2, wherein said baffle mechanism is arranged outside of the extensible-contractible rod of the jack that supports said disk cutter in a free rotational manner.

[CLAIM ITEM 5]

According to an over cutter device of shield excavation propelling machine that executes excessive excavation of a tunnel through advancement and retrieval of a disk cutter in the radial direction of the cutter head by a jack that is installed at the position adjacent to outer circumference of the cutter head, the over cutter device of shield excavation propelling machine is characterized by the fact that is equipped with a locking mechanism that positions said disk cutter that is driven outward in the radial direction of a cutter head by said jack at that location, a locking measure of that locking mechanism, and a lock release measure that releases that lock.

[CLAIM ITEM 6]

The over cutter device of shield excavation propelling machine according to the claim item 5, wherein the locking measure that positions said disk cutter that is driven toward outside of said cutter head at that location and said lock release measure that releases that lock are driven through hydraulic pressure.

[CLAIM ITEM 7]

The over cutter device of shield excavation propelling machine according to the claim item 5, wherein either one of said locking measure that positions said disk cutter that is driven toward outside of said cutter head at that location or said lock release measure that releases that lock is driven by hydraulic pressure while the other one is driven by an elastic force of an elastic body.

[CLAIM ITEM 8]

The over cutter device of shield excavation propelling machine according to the claim item 5, wherein the locking mechanism that positions said disk cutter that is driven toward outside of the cutter head by said jack at that location is arranged inside of the jack.

[CLAIM ITEM 9]

The over cutter device of shield excavation propelling machine according to the claim item 8, wherein said locking mechanism consists of pin[s] arranged inside of a fixed rod and fit together inside of the extensible-contractible rod of the jack and pin hole[s] which are arranged on the extensible-contractible rod of the jack.

[CLAIM ITEM 10]
The over cutter device of shield excavation propelling machine according to the claim item 8, wherein said locking mechanism consists of pin[s] which are arranged on a cylinder of the jack and pin hole[s] which are arranged on the expansion rod of the jack.

[CLAIM ITEM 11]
The over cutter device of shield excavation propelling machine according to the claim item 5, wherein the locking mechanism that positions disk cutter that is driven toward outside of said cutter head by said jack is arranged outside of the jack.

[CLAIM ITEM 12]
The over cutter device of shield excavation propelling machine according to the claim item 5, wherein it is equipped with a measure that allows successful operation of said locking measure that positions said disk cutter at that location after it is driven in outward radial direction of the cutter head, and of said lock release measure that releases locking prior to disk cutter is driven toward inside of the diameter of the cutter head.

[CLAIM ITEM 13]
The over cutter device of shield excavation propelling machine according to the claim item 12, wherein said successful operation measure is of an automated operation measure.

[CLAIM ITEM 14]
The over cutter device of shield excavation propelling machine according to the claim items 5 ~ 13, wherein is equipped with any one of the constitution described in the claim items 1 ~ 4.

[DETAILED EXPLANATION OF THE INVENTION]
[0001]
[FIELDS OF INDUSTRIAL APPLICATION]
This invention relates to the over cutter device of shield excavation propelling machine, and in particular, it relates to the over cutter device of shield excavation propelling machine in which during the time of excessive excavation of a tunnel, it positions the over cutter at that location by advancing it in the radial direction of the cutter head while is capable of optionally extracting said over cutter during ordinary excavation.

[0002]
[PRIOR ART]
According to the first prior art " Utility Model Kokai Sho 61[1976]-6598" and second prior art "Utility Model Kokai Hei 5[1993]-27197", they describe an over cutter device of shield excavation propelling machine that advances and retreats disk cutter outward in radial direction of the cutter head to conduct excessive excavation of a tunnel through a hydraulic jack that is installed at the position adjacent to outer circumference of the cutter head.

[0003]
According to the first prior art that is illustrated in the Figure 17 ~ Figure 19, in the case of a tunnel excavation propelling machine in which plural numbers of disk cutter assemblies (63), (64) are attached to a front plane of a cutter head (62) that is arranged at a front part of the shield main body (61) in a free rotational manner; and regarding a copy disk cutter assembly (64) that is one of said disk cutter assemblies (63), (64), and is attached to an outer circumference side of the cutter head (62) , the copy disk cutter (64a) [note: the term copy disk cutter is expressed as (64) once and as (64a) here in the original document. Translator's note] is designed as possible of movement adjustment in a forward diagonal and outward direction of the cutter head (62) through a extending portion adjustment mechanism (65) that is illustrated in the Figure 18.

[0004]
As illustrated in the Figure 18 and Figure 19, regarding said extending portion adjustment mechanism (65), a cylindrical shaped jack case (65a) is fixed to a back plane of face plate (62a) of the cutter head (65) with an anchoring jig (67) ; and a ring shaped hydraulic jack (68) is enclosed in the inner bottom part of this jack case (65a). As illustrated in the Figure 18 with a dashed line, according to this hydraulic jack (68), a piston (68b) of ring shape is enclosed in a ring shaped cylinder (68a); and top end (68c) of the piston rod that is arranged to protrude from a top plane of the piston (68b) is in contact with a lower side of the annular part (65c) of the cutter case (65b) of which lower end side is enclosed in the jack case (65a). This cutter case (65c) is of a cylindrical shape, and said annular part (65c) is arranged to protrude at its lower end side , and at the same time, an inner circumference part of this annular part (65c) extends to the bottom side, and outer circumference plane of said annular part (65c) that extends to the bottom side rubs against inner circumference of the cylinder (68a) of the hydraulic jack (68) , and a dust seal (66) is installed to prevent from sand or earth to enter the hydraulic jack (68).

[0005]
In addition, the top end part of the cutter case (65b) is fitted and pressed against guide member (65d) that is anchored to the face plate (62a) of the cutter head (62) in a free rubbing and slide manner. This guide member (65d) is of a cylindrical shape, and key groove[s] (65e) are formed at the position where inner circumference planes [of the guide member (65d)] are mutually opposite to each other in an axis direction ; and a baffle key (65f) that is arranged to protrude from the outer circumference plane of said cutter case (65b) is fitted in these key groove[s] (65e) to stop the rotation of said cutter case (65b). Said disk cutter assembly (64) consists of a copy disk cutter (64a) and bearing part (64b) that supports this copy disk cutter (64a) in a free rotational manner; and bottom part of the bearing part (64b) is anchored to a clamp seat (65g) that is arranged to protrude from the inner circumference plane of the cutter case (65b), and at the same time, cutter ring (64c) is arranged to protrude from the outer circumference plane of the copy disk cutter (64a). In addition, on the rubbing and sliding plane with the cutter case (65b) of the guide member (65d), a dust seal (70) that prevents from entrance of earth and sand to the sliding plane is attached.

[0006]
The actions of the first prior art are explained. Because hydraulic jack (68) remains constricted during an ordinary excavation, the copy disk cutter (64a) remains extracted , and shows a similar level of extending portion level to that of the disk cutter (63a). The shield main body (61) is advanced while the cutter head (62) is rotated in this state and advances by excavating a facing [working face] that is in front of the shield main body (61) with disk cutters (63a), (54a); and after excavated earth and sand are taken into a chamber (61a) from an earth and sand intake port (62a) of the spoke (62a). they are transported to the back with an already known earth removal device not illustrated in the Figures.

[0007]
Then, when excessive excavation is required as in the case of implementation of a curved line, hydraulic pressure is supplied to the piston (68b) of hydraulic jack (68) that is of the extending portion adjustment mechanism (65) in downward direction to push up the cutter case (65b) by the hydraulic jack (68), and results in protruding copy disk cutter (64a) to ease excessive excavation by the copy disk cutter. In addition, because it is possible to provide a sufficient level of protrusion to the copy disk cutter (64a), it becomes possible to easily secure excessive excavation level required for the implementation of a sharp curved line.

[0008]
According to the Figures 20 ~ 22 which illustrate second prior art, there is an arrangement of a cylinder device (84) at the appropriate location on a frontal plane circumference edge of the cutter head, and this [cylinder device] supports holding body[s] (83) which hold sloped roller bit[s] (82) in free rotational manner via support axis (81) in possible free oscillation in forward direction to oscillate said holding body (83) to move outer circumference part of said sloped roller bit[s] (82) between outside position of the shield main body (72) and inside position of the shield main body (72).

[0009]
Actions of the second prior art are explained. Because cylinder device (84) remains constricted during ordinary excavation, sloped roller bis[s] are extracted to the position shown with a continuous line.. The shield main body (72) is advanced while rotating said cutter head (74) in that state, and when facing that is in front of the shield main body (72) is excavated with a cutter that is arranged on the cutter head (74), thus excavated earth and sand are first taken into a chamber (73) from the cutter head (74), and then, they are transported to the back by a earth remover device and are discarded. Then, in the case of required excessive excavation such as the case of implementation of a curved line, when the cylinder device (84) is extended, because holding body (83) is oscillated by the cylinder device (84) at around support axis (81) in forward direction, sloped roller bit[s] move to the position of virtual line to enable to conduct excessive excavation by these sloped roller bit[s] (82). In addition, because it is possible to provide sufficient protruding rate to the sloped bit[s] (82), it is possible to easily secure excess excavation rate required for the implementation of a sharp curved line in the same manner as explained in the first prior art.

[0010]
In addition, according to the "Patent Kokai Hei 6[1994]-193388" that is the third prior art illustrated in the Figures 23 (A) ~ (C) , an over cutter device of excavation propelling machine that implements excessive excavation by advancing the disk cutter in outward radial direction of the cutter head through hydraulic jack that is installed at the position adjacent to outer circumference of the cutter head , and by fixing the disk cutter at that position is described. According to the third prior art, it is constructed in such manner that slide block[s] (93) which axially support roller bit[s] (91) are arranged on the cutter disk of a shield excavation propelling machine in free appearance-disappearance manner , and a tapered plane (94) is formed at bottom edge of the slide block[s] (93), wedge member (95) that holds said slide block[s] (93) and advances and retrieves while agreeing with this tapered plane (94), and wedge jack (96) that advances and retrieves this wedge member (95) is arranged, and press up jack (96) that presses said slide block[s] (93) up is arranged to construct said roller bit[s] (91) in free appearance-disappearance manner.

[0011]
Actions of the third prior art are explained. After the primary roller bit[s] (91) are worn, secondary roller bit[s] are made to protrude toward ground and hill side in the manner explained below. First of all, hydraulic pressure is applied to the hydraulic line (97) to simultaneously work the wedge jack (96) and press up jack (92) which are connected to this. When this is done, while wedge member (95) that is connected to the wedge jack (96) pushes up said tapered plane (94) of a bottom part (93c) of the slide block[s] (93), the press up jack (92) presses a top part (93a) of the slide block[s](93). At this time, wedge member (95) and tapered plane (94) are fitted in concave and convex ( ) manner so the wedge member (95) that moves along the bottom plane (98a) of the support frame (98) would not fall out from an opening part of the support frame (98). Slide block[s] (93) protrude to ground and hill side, and roller bit[s] which are axially supported by these also protrude. The amount of protrusion is determined with contact of lower part[s] (93c) of the slide block[s] (93) with bottom plane (90c) of the sandwiching member (90). At this time, when said wedge member (95) advances to the prescribed rate, a fixed pin (86) arranged at lower part of the wedge member (95) fits into a pin hole (87) that is arranged at the bottom plane of the wedge member (95). With this action, roller bit[s] (91) are fixed in a protruded state.

[0012]
In addition, because check valve (88) is arranged inside of the wedge jack (96) that moves wedge member (95), the wedge jack (96) that has once moved to advanced position would not return to its original position, and with this action, roller bit[s] (91) are fixed in a protruding state. That is to say, the roller bit[s] (91) are fixed in protruded state by a double lock mechanism of check valve enclosed wedge jack (96) and fixed pin (86) that fits into the pin hole (87). As described above, according to this structure, secondary roller bit[s] (91) protrude to ground and hill side automatically by simply applying a hydraulic pressure to the hydraulic line (97) to be fixed in that state. In addition, when connection is made with each secondary roller bit having arrangement of plural numbers of said hydraulic lines (17) to have a common hydraulic line, it is possible to press up plural number of secondary roller bits simultaneously with one same hydraulic line.

[0013]
[SUBJECTS SOLVED BY THIS INVENTION]
However, according to the first prior art and second prior art, because they are not equipped with a positioning measure for the copy disk cutter (64a) or sloped roller bit[s] (82), oil of the hydraulic jack (68) or (84) leaks to cause problem of not possible to implement the prescribed level of excessive excavation due to counter excavation force that works on the copy disk cutter (64a) or sloped roller bit[s] (82). In addition, according to the first prior art, it is constructed of each rubbing and slide part of cutter case (65b) and guide member (65d), annulus part (65c) and jack case (65a), key groove (65e) and baffle key (65f), and annulus part (65c) and cylinder (68a); and according to the second prior art, it is constructed by sloped roller bit[s] (82) oscillating holding body (83) that is held in a free rotational manner through support axis (81) in forward direction by the cylinder device (84) to move outer circumference part of the sloped roller bit[s] (82) from inner position of the shield main body (72) to outer position, both [cases] present problems of complex structures. In addition, although lubricant such as grease and the like is generally sealed by seal (66), (70) at each rubbing and slide part of the first prior art, this lubricant has been known to leak outside to cause poor lubrication.

[0014]
According to the third prior art, when wedge member (95) that works by the jack (96) is advanced at the prescribed rate, fixed pin (86) that is arranged at lower part of the wedge member (95) becomes fixed in the pin hole (87) that is arranged at the bottom plane of the wedge member (95), and therefore, roller bit[s] (91) becomes fixed in a protruding state. In addition, because baffle valve (88) is arranged inside of the wedge jack (96) that moves wedge member (95), the wedge jack (96) that moves to the advanced position once would not return to original; and with this action, roller bit[s] (91) are fixed in a protruding state. That is to say, although the roller bit[s] (91) are fixed in a protruding state by the double lock mechanism of baffle valve enclosing wedge jack (96) and fixed pin (86) that is fixed in the pin hole (87), there has been a problem that roller bit[s] (91) cannot be extracted as needed from inside of shield machine in remote manner. Furthermore, when there is a need for said extraction, a worker must move to a front plane of the cutter head to detach the locking mechanism of disk cutter to not only require multiple number of works but also, dangerous work had to be conducted.

[0015]
[MEASURES USED TO SOLVE THE SUBJECTS]
In order to solve the subjects of said prior arts, according to an over cutter device of shielding excavation propelling machine that implements excessive excavation of a tunnel through advancement and retrieval of the disk cutter in the radial direction of the cutter head by the jack that is installed at the position adjacent to outer circumference of the cutter head, the first invention that pertains to this invention's over cutter device of shielding excavation propelling machine is designed to directly support said disk cutter at top end of the extensible-contractible rod of the jack in a free rotational manner. The jack that is attached to the top end of said disk cutter in a free rotational manner may have a baffle mechanism; and said baffle mechanism may be installed either inside or outside of the extensible-contractible rod of the jack that supports said disk cutter in a free rotary manner.

[0016]
In addition, according to an over cutter device of shielding excavation propelling machine that implements excessive excavation of a tunnel through advancement and retrieval of the disk cutter in the radial direction of the cutter head by the jack that is installed at the position adjacent to outer circumference of the cutter head, the second invention that pertains to this invention's over cutter device for shielding excavation propelling machine is designed with a locking mechanism in which disk cutter that is driven outside of the cutter head by said jack at that position, a locking measure of that locking mechanism, and lock release measure that releases that lock. The locking measure that positions the disk cutter that is driven to outside of said cutter head at that position, and lock release measure that releases that lock may be driven by hydraulic pressure, or one of them may be driven by hydraulic pressure while the other is driven by an elastic force of an elastic body; and the disk cutter that is driven to outside of the cutter head, and locking mechanism that positions that position may be arranged inside of the jack, or it may be constructed of a pin that is installed on the cylinder of the jack and pin hope that is arranged on the extensible-contractible rod of the jack, or the locking mechanism that position the disk cutter that is driven outside of said cutter head at that position may be also arranged outside of the jack.

[0017]
In addition, the over cutter device of said shielding excavation propelling machine may be equipped with a locking mechanism that positions disk cutter that is driven outside in radial direction of the cutter head by the jack at that location, locking measure of that locking mechanism, and lock release measure that releases that lock, and furthermore, said disk cutter may be directly supported at the top end of extensible-contractible rod of the jack in a free rotational manner. According to the over cutter device of said shielding excavation propelling machine, said locking measure may have a successful operation measure that positions disk cutter after it is driven outward in a radial direction of the cutter head at that location, and lock release measure releases lock prior to disk cutter being driven outward in a radial direction of the cutter head; and this successful operation measure may be of automated operation measure as well.

[0018]
[ACTIONS]
Actions by above-explained structure are explained. According to the first invention that pertains to this invention's over cutter device of shielding excavation propelling machine, the shielding excavation propelling machine is capable of advancing and retrieving the disk cutter in radial direction of the cutter head optionally in accordance to extension and contraction of the jack based on excessive excavation implementation or ordinary excavation implementation of a tunnel; and at the same time, structure is simplified by directly supporting said disk cutter at a top end of the extensible-contractible rod of the jack in a free rotational manner. When baffle mechanism of said disk cutter is arranged on the jack, or in particular, when it is installed inside of extensible-contractible rod of the jack, it is further possible to simplify the structure. In addition, the second invention that pertains to the over cutter device of shielding excavation propelling machine of this invention is designed that the shielding excavation propelling machine is capable of advance and retrieve said disk cutter in radial direction of the cutter head optionally through extension and contraction of the jack in accordance with implementation of excessive excavation a tunnel or ordinary excavation; and at the same time, because it is capable of positioning the disk cutter that is driven outward in radial direction of the cutter head during implementation of excessive excavation of a tunnel at that location, even when excavation counter force from ground and hill may work, disk cutter would not move inward in radial direction of the cutter head to allow accurate implementation of excessive excavation. Furthermore, when locking of the disk cutter is released through lock release measure, because disk cutter can move inward in radial direction of the cutter head by the jack, it is possible to accommodate toward ordinary excavation implementation in optional manner.

[0019]
According to the over cutter device of shielding excavation propelling machine, it is possible to operate driving of the disk cutter in radial direction of the cutter head, locking measure, and lock release measure simultaneously and smoothly without hindering each other's action through arrangement of a successful operation measure that allows positioning the disk cutter at that location after driving that outward in radial direction of the cutter head by said locking mechanism, and allows release of lock prior to driving the disk cutter inward in the radial direction of the cutter head by the lock release measure. In particular, it is possible to enhance energy saving when said successful operation can be worked in an automated manner.

[0020]
[EXAMPLES]
This invention's examples are explained in reference with attached drawings. Figure 1 illustrates a side sectional view of shielding excavation propelling machine to which over cutter device of shielding excavation propelling machine that pertains to the 1st example of this invention is attached; and Figures 2 illustrates views of over cutter device of shielding excavation propelling machine that pertains to the 1st example of this invention, and (A) illustrates a top view that shows partial sectional view, and (B) illustrates a side view of partial sectional view; and Figures 3 illustrate views of over cutter device of shielding excavation propelling machine that pertains to the 1st example of this invention, and (A) illustrates a frontal view of the Figure 2 (A), and (B) illustrates A-A sectional view of the Figure 2(A), and (C) illustrates B-B sectional view of the Figure 3(B). Figure 4 illustrates over cutter device of shielding excavation propelling machine that pertains to this invention , and illustrates locking mechanism of the 1st example that positions the jack to which disk cutter is attached, and lock release measure of the 1st example that releases lock ; and Figure 5 illustrates a work explanatory view of the first stage of extension of the jack in the Figure 4; and Figure 6 illustrates a work explanatory view of the second stage of extension of the jack in the Figure 4; and Figure 7 illustrates a work explanatory view of the third stage of extension of the jack in the Figure 4; and Figure 8 illustrates a work explanatory view of the first stage of contraction of the jack in the Figure 4; and Figure 9 illustrates the second stage of contraction of the jack in the Figure 4; and Figure 10 illustrates the third stage of contraction of the jack in the Figure 4.

[0021]
According to the over cutter device of shielding excavation propelling machine that pertains to this invention, the Figure 11 illustrates a view of the 1st example of locking mechanism that positions the jack to which disk cutter is attached, and 2nd example of locking measure that works that locking mechanism and lock release measure that releases locking; and according to the over cutter device of shielding excavation propelling machine that pertains to this invention, the Figure 12 illustrates the 1st example of locking mechanism that positions the jack to which disk cutter is attached, and the 3rd example of locking measure that works that locking mechanism and lock release measure that releases locking.

[0022]
The Figure 13 illustrates a view of locking mechanism of the 2nd example that positions the disk cutter of the over cutter device of shielding excavation propelling machine that pertains to this invention; and Figure 14 illustrates a view of locking mechanism of the 3rd example that positions disk cutter of the over cutter device of shielding excavation propelling machine that pertains to this invention; and Figure 15 illustrates a view of locking mechanism of the 4th example that positions disk cutter of the over cutter device of shielding excavation propelling machine that pertains to this invention; and Figures 16 illustrate examples of locking mechanism that positions disk cutter of over cutter device of shielding excavation propelling machine that pertains to this invention, and (A) shows a view of the 5th example, and (B) shows a view of the 6th h example.

[0023]

Explanation on the structure of the over cutter device of shielding excavation propelling machine , and the shield excavation propelling machine to which said over cutter device is attached and pertains to the 1st example of this invention and are illustrated in the Figure 1 ~ Figure 3 is given below. According to the Figure 1, a bulk head (3) is fixed to the shield main body (2) of the shielding excavation propelling machine (1); and cutter head support (4) is fixed to this shield main body (2) and the bulk head (3); and cutter head (6) is supported to this cutter head support (4) through bearing (5) in a free rotational manner. At the front plane of this cutter head (6), multiple numbers of disk cutters (7) are attached in a free rotational manner, and at the same time, at nearby outer circumference of the cutter head (6), the over cutter device (11) comprising hydraulic jack (8) that has hydraulic jack (8) with extensible-contractible rod (9) capable of extending and contracting in radial direction of the cutter head, and disk cutter (10) for over cutter that is supported at the top end of that extensible-contractible rod (9) in a free rotational manner. In addition, at the back part of the cutter head (6), bulk head (12) for purpose of removal of earth after taking in excavated earth and sand is formed with cutter head (6) and bulk head (3).

[0024]

As illustrated in the Figure 2 and Figure 3in details of said hydraulic jack (3), cylinder (13) of the hydraulic jack (8) is fixed to a base (14); and this base (14) is fixed to the cutter head (6) with bolt (15). Piston (18) is fitted to the cylinder (13), and extensible-contractible rod (9) that is capable of extension and contraction in outward direction of the cylinder (13) is fixed to this piston (18); and disk cutter (10) is supported in a free rotational manner to the yoke (19) that is fixed to outer edge part of said extensible-contractible rod (9). In addition, a shaft (17) showing a square shaped cross section and extends inward of the cylinder (13) is fixed to the end panel (16) of the cylinder (13); and this shaft (17) fits in a hole that shows square shaped cross section and is formed inside of said extensible-contractible rod (9) to form a baffle device of said extensible-contractible rod (9).

[0025]

As illustrated in the Figure 2, the A port that is shown with a chain line and is formed on the cylinder (13) connects to a bottom chamber of the cylinder (13) through passage (20); and in addition, B port that is shown with a chain line and is formed on the cylinder (13) connects to a rod chamber of the cylinder (13) through passage (21). In addition, on the shaft (17), notch (22) that connects to the bottom chamber of the cylinder (13) when piston (18) moves to extending end of the extensible-contractible rod (9) is formed; and this notch (22) connects to the lock hydraulic chamber (26) illustrated in the Figure 3 (B) through passage (34). As illustrated in the Figure 3 (B), arrangement of lock pin cylinders (25), (25) in which two lock pin pistons (24), (24) which are as one body with opposing lock pin (23) are fitted is made inside of the shaft (17). In addition, to the shaft (17) that is outside in axial direction of the lock pin (23), flange (28) with formed pin hole (27) to which lock pin (23) is fitted in free sliding manner is fixed; and pin hole (29) that connects to the pin hole (27) is formed at square hole wall of the extensible-contractible rod (9) that is in contact with this pin hole (27). In addition, C port that is formed on the cylinder (13) connects to rod chamber of lock pin cylinders (25), (25) through passages 30 ~ 32, and small oil chamber (33).

[0026]
The over cutter device of shielding excavation propelling machine that pertains to the first example of this invention and is illustrated in the Figure 1 ~ Figure 3, and actions of shielding excavation propelling machine to which that over cutter device is attached are explained. According to the Figure 1, when said cutter head (6) that is supported with the cutter head support (4) through bulk head (5) in a free rotational manner is rotated and driven by an already known hydraulic motor or drive motor not illustrated in the Figures, ground and hill are excavated with multiple number of disk cutters (7) which are attached to the front plane of the cutter head (6) in a free rotational manner. The excavated earth and sand are first taken into a bulk head (12), and then, are discharged to a back part with already known earth removal device not illustrated in the Figures.

[0027]
When excessive excavation as in the case of excavating curbed line part during this ground and hill excavation is required, extensible-contractible rod (9) of that hydraulic jack (8) is extended in the radial direction of the cutter head by the over cutter device (11) that is fixed at nearby outer circumference of the cutter head (6). With extension of this extensible-contractible rod (9), the disk cutter (10) that is supported with the extensible-contractible rod (9) in a free rotational manner also extends to the position shown with a solid line from the location shown with a chain line in the Figure 1; and therefore, it is possible to conduct excess excavation necessary to the excavation propelling of the curved line part. When excessive excavation is completed, extensible-contractible rod (9) of said hydraulic jack (8) is constricted inward in radial direction of the cutter head. Through this constriction of said extensible-contractible rod (9), the disk cutter (10) that is supported with said extensible-contractible rod (9) in a free rotational manner to allow cutter head to constrict inward in the radial direction from the position shown with a solid line to the location shown with a chain line to enable to conduct ordinary excavation.

[0028]
Then, actions of the over cutter device (11) are explained in details with Figure 2 and Figure 3. When excessive excavation as in the case of excavating curbed line part is required, pressure oil is supplied to the bottom chamber of cylinder (13) through passage (20) from the A port of the hydraulic jack (8), and oil is discharged from the B port through passage (21) from the rod chamber of the cylinder (13). When piston (18) and extensible-contractible rod (9) reaches end of extension, the notched part (22) that is formed on the shaft (17) connects to the bottom chamber of the cylinder (13), and therefore, pressure oil in the bottom chamber of the cylinder (13) is supplied to the lock hydraulic chamber (26) through passage (34) to result in pressing lock pin piston (24) outward to fit lock pin (23) that is of one body with lock pin piston (24) in the pin hole (29) that is formed on the extensible-contractible rod (9). And therefore, because extension and contraction of the extensible-contractible rod (9) are locked, disk cutter (19) that is attached to said extensible-contractible rod (9) is also fixed at the position against radial direction of the cutter head. And therefore, even when a large excavation counter force may work against disk cutter (19), disk cutter (10) would not move inward in the radical direction of the cutter head (6). In addition, because square hole that is formed within said extensible-contractible rod (9) is fitted to the shaft (17) that shows a square cross section and is fixed to the cylinder (13), the disk cutter (10) that is attached to the top end of the extensible-contractible rod (9) in a free rotational manner is securely baffled against rotation around axis of the extensible-contractible rod (9). In this manner, positioning of the disk cutter (10) can be attained correct and secure to allow accurate excessive excavation implementation.

[0029]

When excessive excavation is not required, first of all, pressure oil is supplied from the C port through passages 30 ~ 32, and via small oil chamber (33) to the rod chamber of the lock pin cylinder (25), and by doing so, the lock pin piston (24) constricts to allow lock pin (23) that is of one body with lock pin piston (24) to escape from the pin hole (29) that is formed on the extensible-contractible rod (9). And therefore, lock of extension and contraction movement of the extensible-contractible rod (9) is released. Pressure oil is supplied to the rod chamber of the cylinder (13) from the B port of the hydraulic jack (8) via passage (21), and it is discharged from the A port from the bottom chamber of the cylinder (13) through passage (20); and by doing so, because piston (18) and extensible-contractible rod (9) become constricted, the disk cutter (10) that is attached to the top end of said extensible-contractible rod (9) also constricts inward in radial direction of the cutter head (6) from the position shown with a solid line to the location shown with a chain line in the Figure 1 and Figure 2.

[0030]

1st example relating to the locking mechanism that fixed extension and contraction action of the disk cutter of this invention, and 1st example of lock.lock release measure of that locking mechanism explained with Figure 4 ~ Figure 10. Figure 4 is a basic diagram that shows action measures of the over cutter device explained in the Figure 1 ~ Figure 3; and it illustrates a state in which the over cutter device (11) is stopped . Furthermore, as the over cutter device (11) is identical to that of Figure 1 ~ Figure 3, its explanation is omitted. Within the shield main body (2), electromagnetic switch valve (37) connects its P port to the hydraulic pump (35), and connects T port to the tank (45), and relief valves (36) are connected to each of these connecting lines. In addition, the A port of the electromagnetic switch valve (37) is connected to the rotary joint (39) through flow rate regulator valve (44), and the B port is connected to the rotary joint through flow rate regulator valve (44) and oval flow meter (43). Within the cutter head (6), line that connects to the A port of electromagnetic switch valve (37) connects to the bottom chamber from the A port of the cylinder (13) via pilot check valve (40) , and at the same time, it is connected to the connecting line of the check valve (42) and pilot check valve (41) through relief valve (47). In addition, one of the lines which connect to the B port of the electromagnetic switch valve (37) is connected to the rod chamber from the B port of the cylinder (13) through check valve (42) and pilot check valve (41) while the other one is connected to the rod chamber of the lock pin cylinder (24) from the C port of the cylinder (13) directly, and at the same time, it is connected to connecting line of check valve (42) and pilot check valve (41) through sequence valve (46) and check valve (48).

[0031]

Actions during the time of extension of the hydraulic jack are explained with Figure 5 ~ Figure 7. As illustrated in the Figure 5, when electromagnetic switch valve (37) is operated to (a) position, discharge oil of the hydraulic pump (35) flows as shown with a bold line, and is supplied to the bottom chamber of the cylinder (13) to show a state as illustrated in the Figure 6. While in a state as illustrated in the Figure 6, because pressure oil of the bottom chamber of the cylinder (13) is supplied to the lock hydraulic chamber (26) through notch (22) of the shaft (17), lock pin (23) is pressed out by the lock pin piston (25) to fit into the pin hole (29) that is formed on the extensible- contractible rod (9) to become in a state as illustrated in the Figure 7, and the extensible-contractible rod (9) and disk cutter (10) are locked in an extended state.

[0032]
Then, actions during the time of contraction of the hydraulic jack are explained with Figure 8 ~ Figure 10. As illustrated in the Figure 8, when electromagnetic switch valve (37) is operated to (b) position, discharge oil of the hydraulic pump (35) flows as shown with a bold line, and is connected to the rod chamber of the lock pin cylinder (24), and therefore, lock pin (23) is extracted from the pin hole (29) by the lock pin piston (25) to show a state as illustrated in the Figure 9. When hydraulic pressure of the C port rises in the state illustrated in the Figure 9, pressure oil is supplied from the B port through sequence valve (46) to the rod chamber of the cylinder (13) causing extensible-contractible rod (9) and disk cutter (10) to contract to show a state as illustrated in the Figure 10. Furthermore, relief valves (36), (47), flow rate regulator valves (38), (44), rotary joint (39), pilot check valves (40), (41), check valves (42), (48), and oval flow meter (43) are already known, and as they show not specific actions unique to this example, explanation on these is omitted.

[0033]
On the 2nd example of lock.lock release measure of the over cutter device (11) of this invention when it is applied to the over cutter device (11) explained in the 1st example is explained with the Figure 11. Figure 11 is the similar illustration as that of the Figure 4 of the 1st example; and it illustrates a basic diagram showing action measures of the over cutter device explained in the Figure 1 ~ Figure 3, and shows a state in which over cutter device (11) is stopped. According to the Figure 11, because it shows a structure in which lock.lock release measure of the over cutter device (11) is installed within the shield main body (2), and only the over cutter device (11) is attached inside of the cutter head(6), it is the same as that of lock.lock release measure of the 1st example that is illustrated in the Figure 4 except the point that rotary joint (39) is of 3 ports; and therefore, explanation on that structure and actions are omitted.

[0034]
On the 3rd example of lock.lock release measure of the over cutter device (11) of this invention when it is applied to the over cutter device (11) explained in the 1st example is explained with Figure 12. Figure 12 is the similar illustration as that of the Figure 4 of the 1st example; and it illustrates a basic diagram showing action measures of the over cutter device explained in the Figure 1 ~ Figure 3; and shows a state in which over cutter device (11) is stopped. According to the structure shown in the Figure12, similarly to that of the Figure 11, lock.lock release measure of the over cutter device (11) is arranged inside of the shield main body (2), and only the over cutter device (11) is attached inside of the cutter head (6). The over cutter device (11) of this example is similar to that of the 1st example except the point that the notch (22) part of the 1st example is eliminated, and D port for locking purpose is additionally attached. In addition, regarding the lock.lock release measure of the locking mechanism, it has an arrangement of electromagnetic switch valve (37) specific to lock.lock release instead of eliminating the sequence valve (46) in the lock.lock release measure of the 2nd example, and that P port is connected to the hydraulic pump (35), and T port is connected to the tank (45), and A port is connected to the D port of hydraulic jack (8) through pilot check valve (40), and B port is connected to the C port6 of hydraulic jack (8) through oval flow meter (43), pilot check valve (41). And therefore, rotary joint is of 4 ports.

[0035]
The actions of the 3rd example of lock.lock release measure of the over cutter device (11) of this invention are explained with the Figure 12. Furthermore, in the explanation given below, the portions explained in the 1st and 2nd examples are identified with the same codes, and explanation is omitted; and therefore, only the portion of the 3rd example is explained below. When disk cutter (10) is to be extended and worked, electromagnetic switch valve (37a) is operated to the (a) position, and by doing so, discharged oil of the hydraulic pump (35) is supplied to the bottom chamber of the cylinder (13) of the hydraulic jack (8) to result in extension of the piston (18). After confirming the extension of the piston (8) with the oval flow meter (43), electromagnetic switch valve (37b) that is specific to the lock.lock release is operated to the position (a), and by doing so, discharged oil of the hydraulic pump (35) is connected to the lock hydraulic chamber (26) of the lock pin cylinder (24) to fit the lock pin (23) to the pin hole (29) by the lock pin piston (25).

[0036]
When disk cutter (10) is to be contracted, electromagnetic switch valve (37b) that is specific to the lock.lock release is operated to the (b) position, and by doing so, discharged oil of the hydraulic pump (35) is connected to the rod chamber of the lock pin cylinder (24) to allow lock pin (23) to escape from the pin hole (29) by said lock pin piston (25). After confirming complete escape of the lock pin (23) from the pin hole (29) with oval flow meter (43) that is specific to the lock.lock release, electromagnetic switch valve is operated to the (b) position to supply discharged oil of the hydraulic pump (35) to the rod chamber of the cylinder (13), and therefore, piston (18) becomes contracted. Sequential actions of each electromagnetic switch valve (37) explained above can be by all means automatic by already known electrical measure.

[0037]
Then, 2nd example of locking mechanism in the over cutter device (11) of this invention is explained with Figure 13. Furthermore, in the explanation that is provided below, the portions which are the same as those of locking mechanism of the 1st example in the over cutter device (11) explained in the Figure 4 are shown with identical codes, and their explanation is omitted; and only the portion of the 2nd example is explained. According to this example, it is similar to those of the 1st example except the points that notch part (22) of the hydraulic jack (8) is eliminated and instead, spring (51) is arranged in the spring chamber (26a) that is equivalent to the lock hydraulic chamber (26) illustrated in the Figure 4. In addition, actions of the 2nd example are the same as those of 1st example; and therefore, explanation is omitted.

[0038]
The 3rd example of locking mechanism in the over cutter device (11) of this invention is explained with Figure 14. Furthermore, in the explanation provided below, the portions which are the same as those of locking mechanism of the 1st example in the over cutter device (11) explained in the Figure 4 are shown with identical codes, and their explanation is omitted; and only the portion of the 3rd example is explained. According to this example, because shaft (17) illustrated in the Figure 4 is eliminated, notch part (22a), lock pin (23a), lock pin cylinder (24a), and lock pin piston (25a) are arranged on the cylinder (13), and at the same time, baffle (52) that is fixed to the cutter head (6) is fitted to the plane part (9a) that is formed on the extensible-contractible rod (9) to construct a baffle mechanism of the disk cutter (10). In addition, actions of the 3rd example are the same as those of the 1st example; and therefore, explanation is omitted.

[0039]
The 4th example of locking mechanism in the over cutter device (11) of this invention is explained with Figure 15. Furthermore, in the explanation provided below, the portions which are the same as those of locking mechanism of the 1st example in the over cutter device (11) explained in the Figure 4 are shown with identical codes, and their explanation is omitted; and only the portion of the 4th example is explained. According to this example, lock plate (53), lock plate piston (53a), and lock plate cylinder (54) are arranged on the cutter heat (6); and at the same time, said lock plate (53) is engaged and disengaged in the fitting groove (55) that is formed on the extensible-contractible rod (9) to construct a locking mechanism of the disk cutter (10). In addition, actions of the 4th example are the same as those of the 1st example; and therefore, explanation is omitted.

[0040]
The 5th example of locking mechanism in the over cutter device (11) of this invention is explained with Figure 16(A). Furthermore, in the explanation provided below, the parts which are the same as those of the second prior art explained in the Figure 22 are shown with identical codes, and their explanation is omitted; and only the portion of the 5th example is explained.

According to this example, lock pin cylinder (23b) is attached to the cutter head (74), and lock pin (23b) of this lock pin cylinder (24b) is engaged and disengaged in the pin hole (29b) that is formed on a holding body (83a) to construct locking mechanism of the sloped roller bit[s] (82). The 6th example of locking mechanism in the over cutter device of this invention is explained with Figure 16 (B). Furthermore, in the explanation provided below, the parts which are the same as those of the first prior art explained in the Figure 17 ~ Figure 19 are shown with identical codes, and their explanation is omitted; and only the portion of the 6th example is explained. According to this example, lock pin cylinder (24c) is attached to the jack case (65a), and lock pin (23c) that is of one body with the lock pin piston (25c) that fits with this lock pin cylinder (24c) is engaged and disengaged in the pin hole (29c) that is formed on the annular part (65c) part to construct locking mechanism against extension and contraction of the cutter ring (64c). In addition, actions of the 5th example are the same as those of locking mechanism that pertains to this invention and is explained in the 1st and second prior art , and actions of the 6th example are the same as those of locking mechanism that pertains to this invention, and is explained in the 1st example and first prior art; and therefore, explanation is omitted.

[0041]
[EFFECTS OF THIS INVENTION]
Because this invention is constructed in the manner explained above, it shows following effects:

(1) According to the over cutter device of shielding excavation propelling machine that implements excessive excavation of a tunnel by advancing and retreating a disk cutter in the radial direction of the cutter head by the jack, said disk cutter is directly supported on the top end of the extensible-contractible rod of the jack in a free rotational manner, it is possible to simplify the device.

(2) It is possible to conduct excavation with good efficiency as it can maintain a blade of disk cutter in tangential direction at all times against locus of circular shape drawn on the facing by the disk cutter during the time of over cutting through a baffle mechanism.

(3) When baffle mechanism is arranged inside of the extensible-contractible rod, structure of internal cylinder can be simplified, and at the same time, miss operations caused by involvement of foreign objects, or rust occurrence remain less, and furthermore, as it remains in a lubricated state with hydraulic fluid, it presents less slide resistance.

(4) Because it is equipped with locking mechanism that positions disk cutter that is driven through use of the jack outward in radial direction of the cutter head at that position , and locking measure of that locking mechanism, even when excavation counter force may work on the disk cutter during implementation of excessive excavation of a tunnel, it retains the position of disk cutter to allow implementation of accurate excessive excavation of a tunnel. In addition, because it is equipped with lock release measure that releases lock of said locking mechanism, when excessive excavation of a tunnel is not implemented, it can simply drive the disk cutter inward from the outward in radial direction of the cutter head through use of the jack. (This is because accurate position cannot be secured due to retrieval of the jack during long hours of application that is caused by gradual leak of oil due to excavation counter force action unless locking mechanism is installed as this invention's disk cutter is arranged at the top end of the jack.)

(5) When lock.lock release measure is designed to be driven through hydraulic pressure, lock.lock release can be conducted simply through operation within a shielding machine. In addition, when hydraulic fluid of the jack is used to separate from that circuit, there is not need to separately arrange a hydraulic device to work said locking mechanism.

(6) Hydraulic circuit can be simplified when either one of lock measure or lock release measure is driven through hydraulic pressure while the other is driven by an elastic body.

(7) When locking mechanism is arranged inside of the jack to utilize hydraulic fluid as lubricant for each sliding plane of lock pin piston and lock pin cylinder, it is possible to assure lubrication on sliding plane, and at the same time, it prevents from involvement of foreign matters such as dirt and the like, and it can also improve rust-proofing effect of its nearby portion.

(8) Structure of internal cylinder becomes simple when locking mechanism is arranged outside of the jack.

(9) When extension of the jack , locking, and lock release are conducted successively, they can be carried out smoothly without hindering the extension of the jack by locking and lock release.

(10) When successive measures can be conducted automatically, operator only needs to select extension of the jack during the time of over cutter device operation to enable a simple operation.

[BRIEF EXPLANATION OF THE FIGURES]

[FIGURE 1]

It illustrates a side cross sectional view of shielding excavation propelling machine to which over cutter device of the shielding excavation propelling machine relating to the 1st example of this invention is attached.

[FIGURES 2]

They illustrate views of over cutter device of shielding excavation propelling machine relating to the 1st example of this invention; and (A) illustrates a top view of partial cross section, and (B) illustrates a side view showing partial cross section.

[FIGURES 3]

They illustrate views of over cutter device of shielding excavation propelling machine relating to the 1st example of this invention; and (A) illustrates a frontal view of the Figure 2 (A), and (B) illustrates A-A cross sectional view of the Figure 2 (A), and (C) illustrates B-B cross sectional view of the Figure 3(B).

[FIGURE 4]

According to the over cutter device of shielding excavation propelling machine that pertains to this invention, it illustrates 1st example of locking mechanism that positions jack to which disk cutter is attached, and 1st example of lock measure that works its locking mechanism and lock release measure that releases that lock.

[FIGURE 5] .

It illustrates a work explanatory view of first stage of extension of the jack in the Figure 4.

[FIGURE 6]

It illustrates a work explanatory view of second stage of extension of the jack in the Figure 4.

[FIGURE 7]
It illustrates a work explanatory view of third state of extension of the jack in the Figure 4.

[FIGURE 8]
It illustrates a work explanatory view of first stage of contraction of the jack in the Figure 4.

[FIGURE 9]
It illustrates a work explanatory view of second stage of contraction of the jack in the Figure 4.

[FIGURE 10]
It illustrates a work explanatory view of third stage of contraction of the jack in the Figure 4.

[FIGURE 11]
According to the over cutter device of shielding excavation propelling machine that pertains to this invention, it illustrates the 1st example of locking mechanism that positions jack to which disk cutter is attached, and 2nd example of lock measure that works that locking mechanism and lock release measure that releases said lock.

[FIGURE 12]
According to the over cutter device of shielding excavation propelling machine that pertains to this invention, it illustrates the 1st example of locking mechanism that positions jack to which disk cutter is attached, and 3rd example of lock measure that works that locking mechanism and lock release measure that releases said lock.

[FIGURE 13]
It illustrates 2nd example of locking mechanism that positions disk cutter in the over cutter device of the shielding excavation propelling machine that pertains to this invention.

[FIGURES 14]
They illustrate views of 3rd example of locking mechanism that positions disk cutter in the over cutter device of shielding excavation propelling machine that pertains to this invention, and other example of baffle measure; and (A) illustrates a side cross sectional view, and (B) illustrates A-A cross sectional view of the (A).

[FIGURES 15]
They illustrate views of 4th example of locking mechanism that positions disk cutter in the over cutter device of shielding excavation propelling machine that pertains to this invention; and (A) illustrates a side cross sectional view, and (B) illustrates A-A cross sectional view of the (A).

[FIGURES 16]
They illustrate views of examples of locking mechanism that positions disk cutter of the over cutting device of shielding excavation propelling machine that pertains to this invention; and (A) illustrates the 5th example, and (B) illustrates the 6th example.

[FIGURE 17]
It illustrates a side cross sectional view of surrounding of cutter head of shielding excavation propelling machine of the first prior art.

[FIGURE 18]
It illustrates a side view of over cutter device that is attached to shielding excavation propelling machine illustrated in the Figure 17, and partial cross section of its support device.

[FIGURE 19]
It illustrates a top view of partial cross section of the Figure 18.

[FIGURE 20]
It illustrates a side cross sectional view of shielding excavation propelling machine of second prior art.

[FIGURE 21]
It illustrates a frontal view of the Figure 20.

[FIGURE 22]
It illustrates a side cross sectional view of surrounding of sloped roller bit[s] illustrated in the Figure 20.

[FIGURES 23]
They illustrate third prior art; and (A) illustrates a top view of surrounding of roller bit[s]; and (B) illustrates a side view, and (C) illustrates A-A cross sectional view of the (A).

[DESCRIPTION OF CODES]
1: shielding excavation propelling machine, 2: shield main body, 3: bulk head, 4: cutter head support, 5: bearing, 6: cutter head, 7: disk cutter, 8,8a,8b: hydraulic jack, 9: extensible-contractible jack, 9a: plane part, 10: over cutter, 11, 11a: over cutter device, 12: bulk head, 13, 13a: cylinder, 14: base, 15: bolt, 16: end plate, 17: shaft, 18: piston, 19: yoke, 20,21,30 ~32, 34: passage, 22,22a: notched part, 23, 23a, 23c: lock pin, 24, 24a, 24c: lock pin cylinder, 25, 25a,25c: lock pin piston, 26: lock hydraulic chamber, 26a: spring chamber, 27, 29, 29b: pin hole, 29: flange, 33: small oil chamber, 37: electromagnetic switch valve, 43: oval flow meter, 46: sequence valve, 51: spring, 52: baffle, 53: lock plate, 53a: lock plate piston, 54: lock plate cylinder, 55: fitting groove,

[Figure 1]
I: Shielding excavation propelling machine to which over cutter device of the 1st example is attached,
II: excavation outer diameter during over cutting,
III: outer diameter during ordinary excavation,

[Figure 2]
I: 1st example of over cutter device
II: A port

[Figure 3]
I: 1st example of over cutter device

[Figure 4]
I: 1st example of lock.lock release measure of disk cutter

[Figure 5]
I: work explanatory view during extension of hydraulic jack illustrated in the Figure 4

[Figure 6]
I: work explanatory view during extension of hydraulic jack illustrated in the Figure 4

[Figure 7]
I: work explanatory view during extension of hydraulic jack illustrated in the Figure 4

[Figure 8]
I: work explanatory view during contraction of hydraulic jack illustrated in the Figure 4

[Figure 9]
I: work explanatory view during contraction of hydraulic jack illustrated in the Figure 4

[Figure 10]
I: work explanatory view during contraction of hydraulic jack illustrated in the Figure 4.

[Figure 11]
I: 2nd example of lock.lock release measure of disk cutter
II: inside of shield main body (2)
III: inside of cutter head (6)

[Figure 12]
I: 3rd example of lock.lock release measure of disk cutter
II: inside of shield main body (2)
III: inside of cutter head (6)

[Figure 13]
I: 2nd example of disk cutter locking mechanism of over cutter device

[Figure 14]
I: 3rd example of disk cutter locking mechanism of over cutter device

[Figure 15]
I: 4th example of disk cutter locking mechanism of over cutter device

[Figure 16]
I: 5th and 6th example of disk cutter locking mechanism of over cutter device

[Figure 17]
I: side cross sectional view of the first prior art

[Figure 18]
I: over cutter of the first prior art

[Figure 19]
I: over cutter of the first prior art

[Figure 20]
I: side cross sectional view of the second prior art

[Figure 21]
I: cross sectional view of the second prior art

[Figure 22]
I: over cutter of the second prior art

[Figure 23]
I: over cutter of the third prior art

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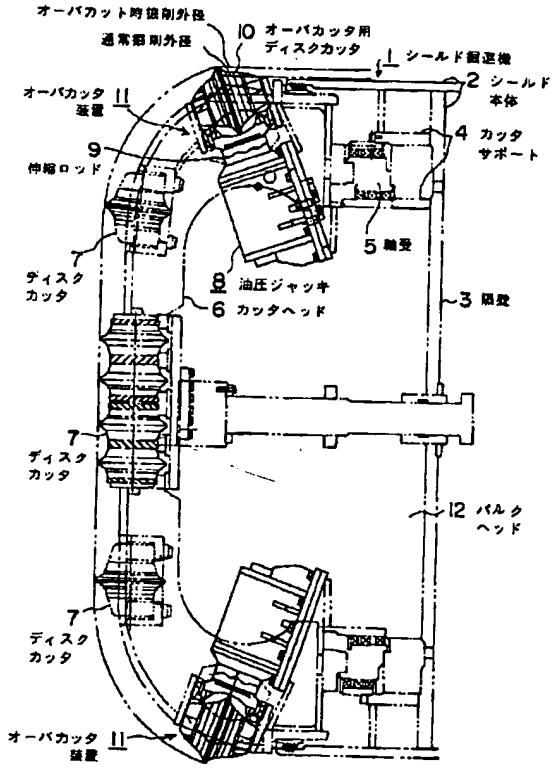
Translation by: Mie N. Arntson, 512-331-7167

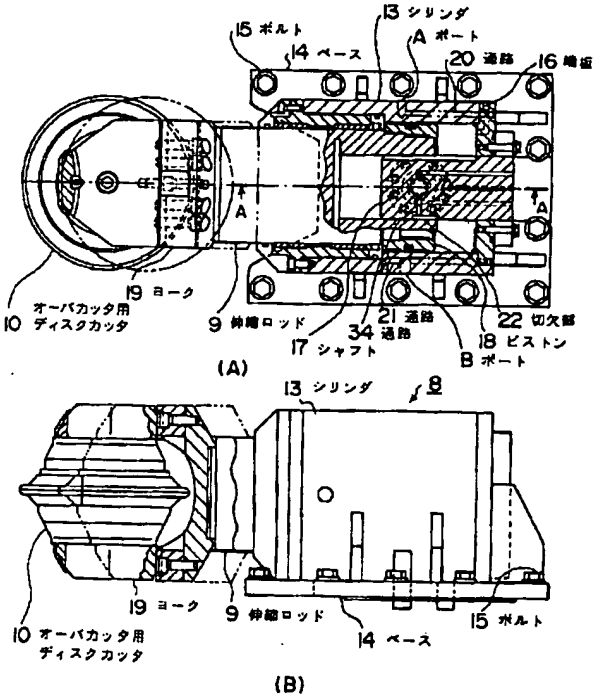
【図１】

第１実施例のオーバカッタ装置を装着したシールド掘進機

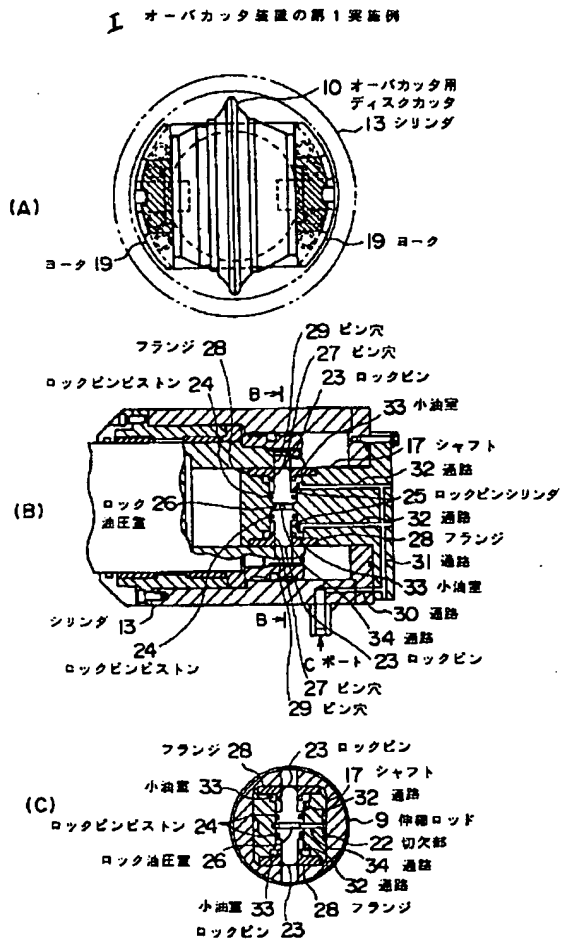


【図２】

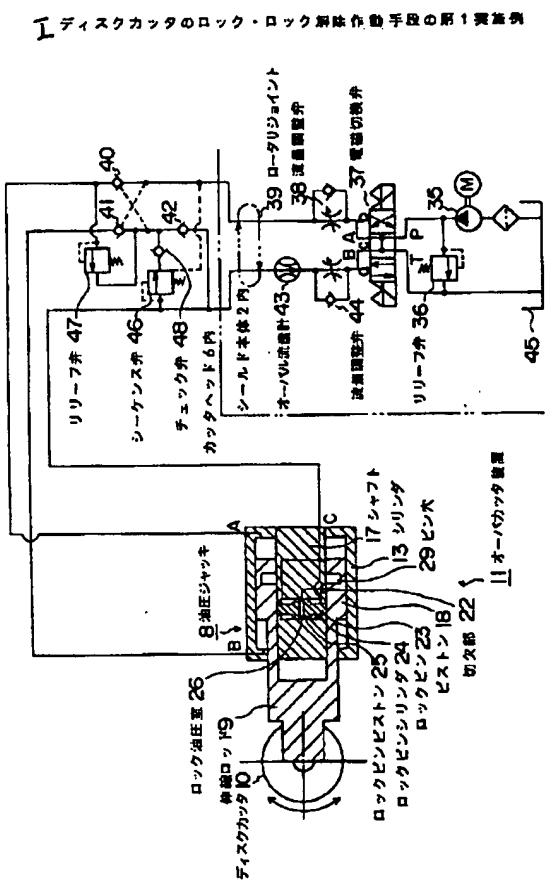
オーバカッタ装置の第１実施例



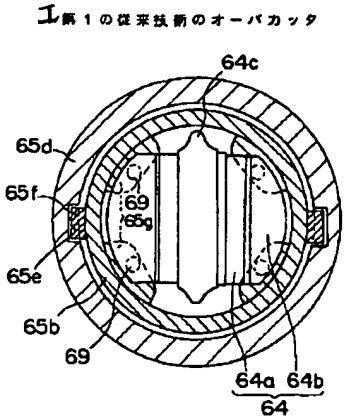
【図3】



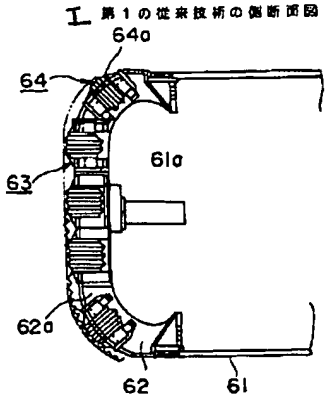
【図4】



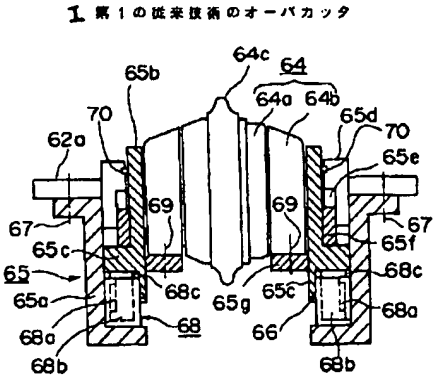
【図19】



【図17】

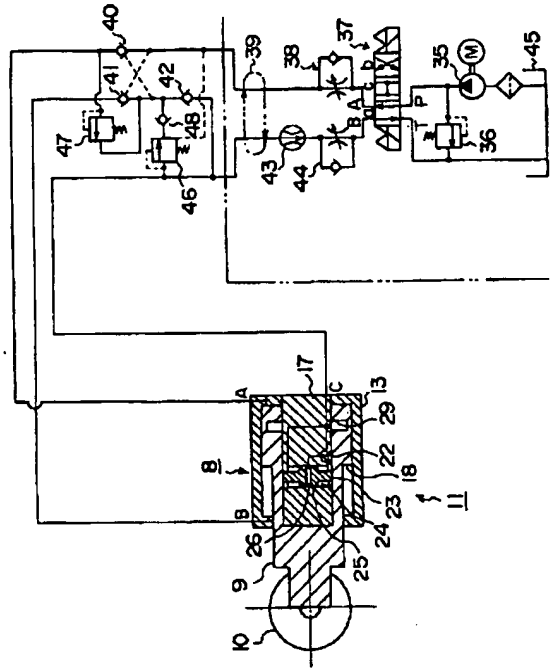


【図18】



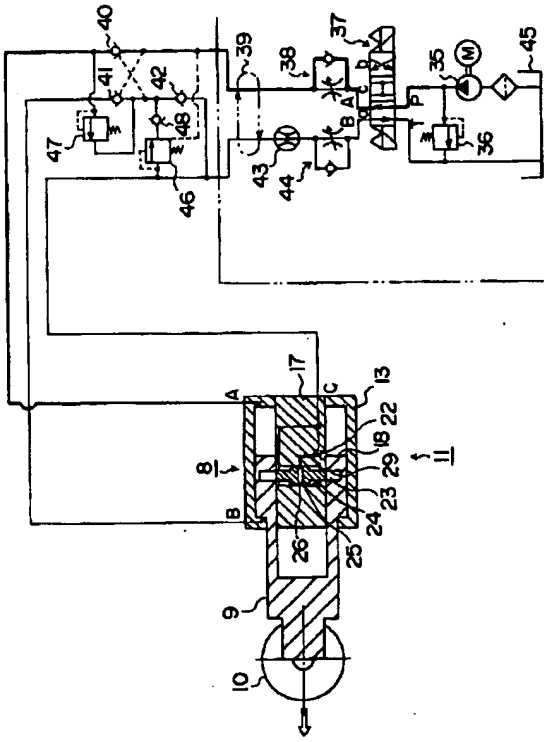
【図5】

1 図4の油圧ジャッキ伸長時の作動説明図



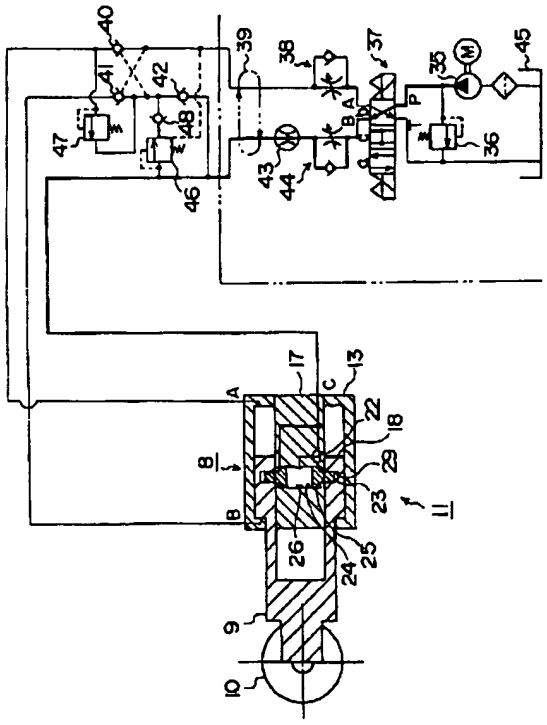
【図6】

1 図4の油圧ジャッキ伸長時の作動説明図



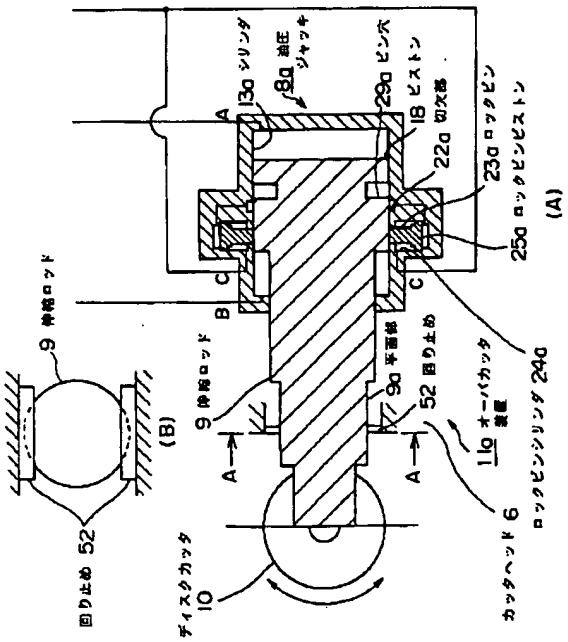
【図8】

1 図4の油圧ジャッキ収縮時の作動説明図



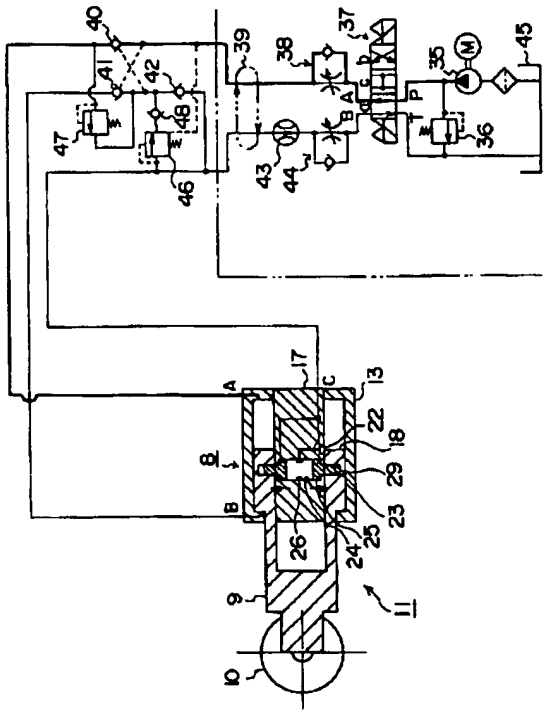
【図14】

1 オーバカッタ装置のディスクカッタロック機構の第3実施例



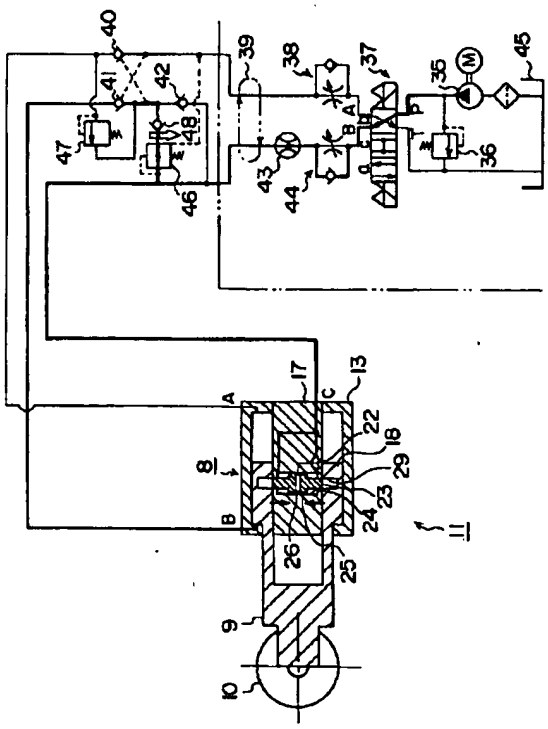
【図7】

図4の油圧ジャッキ伸長時の作動説明図



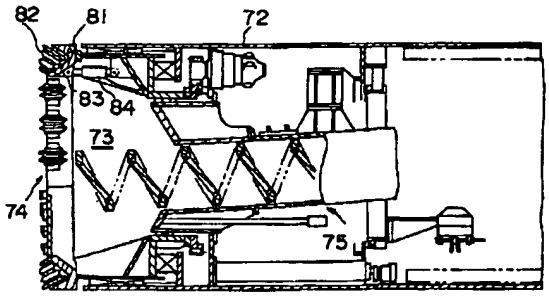
【図9】

図4の油圧ジャッキ収縮時の作動説明図



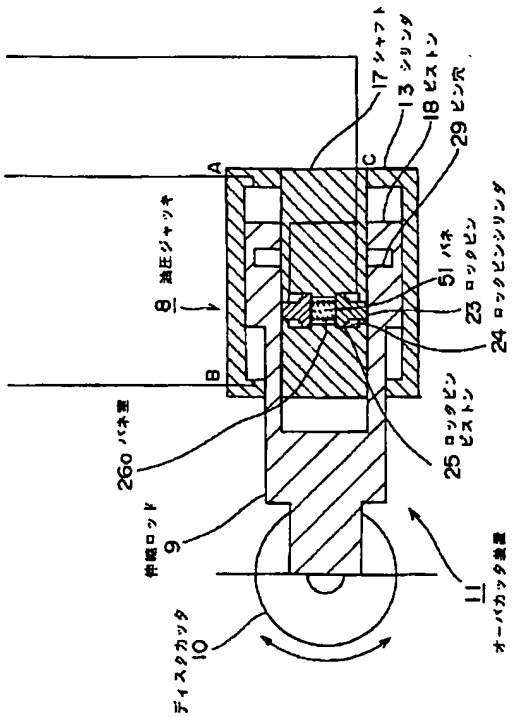
【図20】

図2の従来技術の側断面図

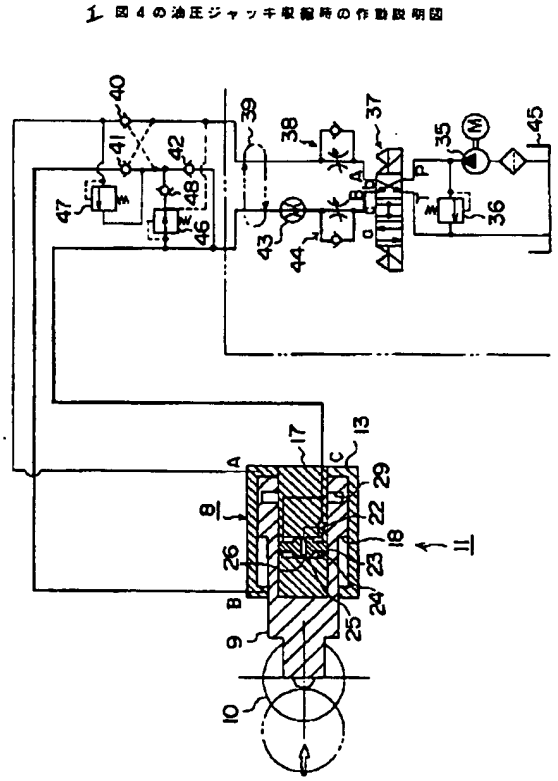


【図13】

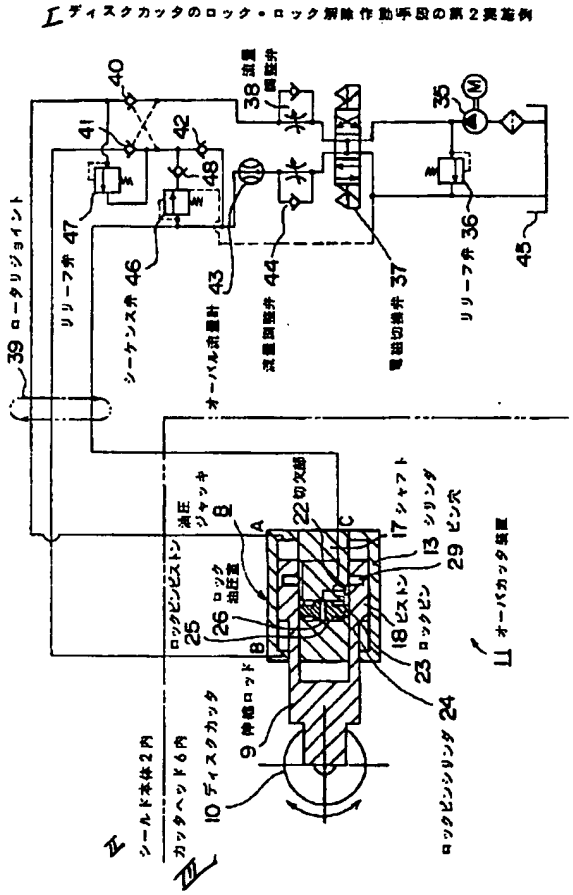
オーバカッタ油圧のディスクカッタロック機構の第2実施例



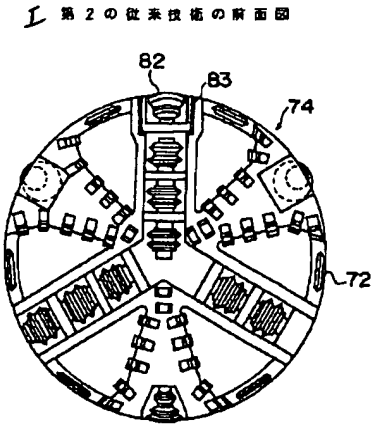
【図１０】



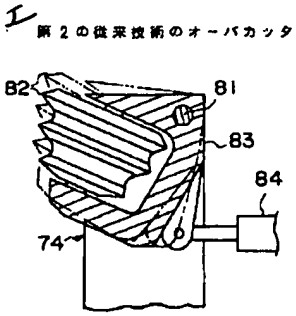
【図１１】



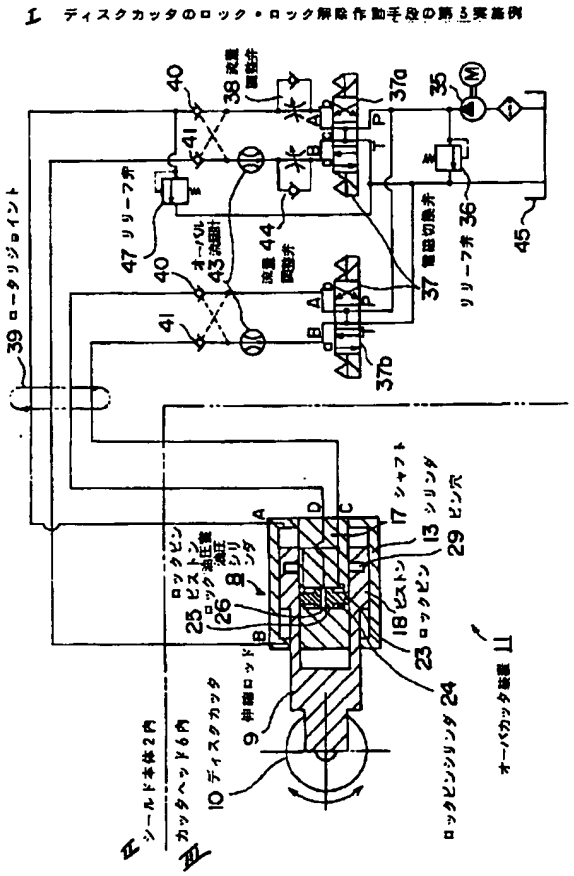
【図２１】



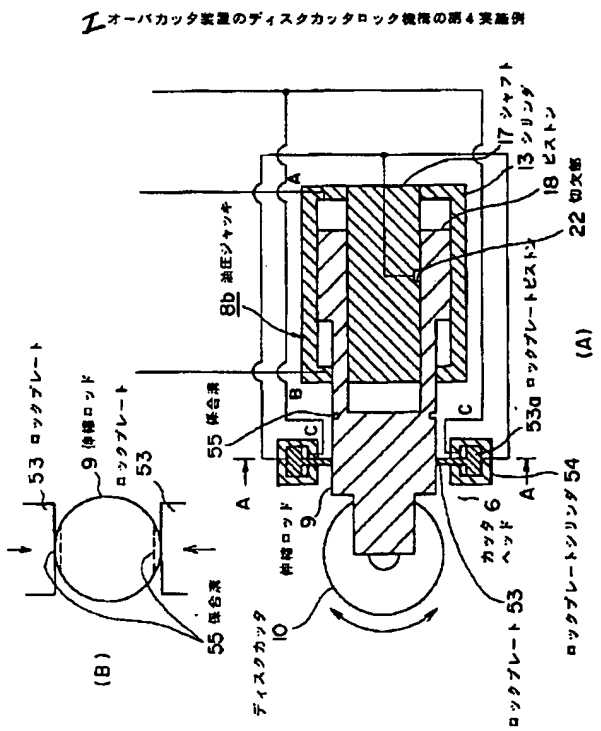
【図２２】



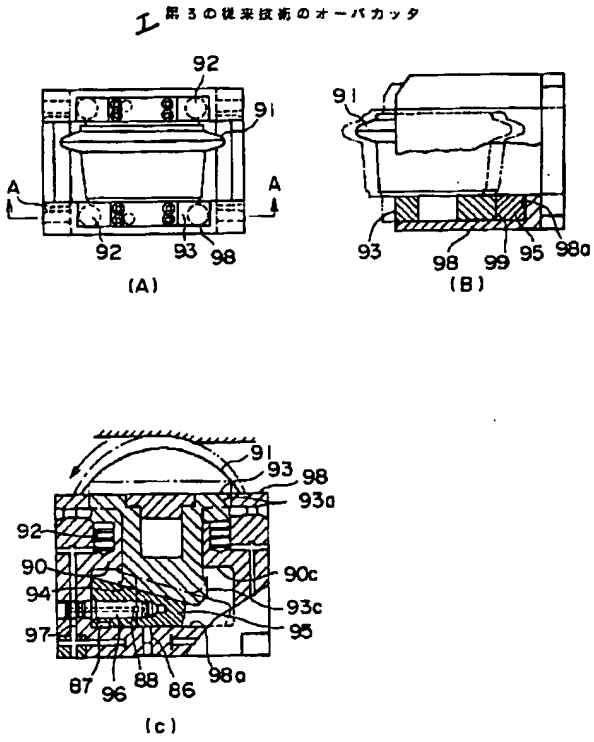
【図12】


I ディスクカッタのロック・ロック解除作動手段の第3実施例
39 ロータリジョイント
40
38 流量調整弁
41
37a
35
M
47 リリーフ弁
43 オーバロード検出弁
44 流量調整弁
37 電磁切換弁
36 リリーフ弁
45
37b
A
B
P
T
17 シャフト
13 シリンダ
29 ピン穴
ロックピン
25 ピストン
26 ロック解除圧室
8 シリンダ
18 ピストン
23 ロックピン
24 ロックピンシリンダ
9 伸縮ロッド
10 ディスクカッタ
カッタヘッド6内
II シールド本体2内
III
11 オーバカッタ装置

【図15】


I オーバカッタ装置のディスクカッタロック機構の第4実施例
17 シャフト
13 シリンダ
18 ピストン
22 切欠部
8b 油圧ジャッキ
53a ロックプレートピストン
(A)
55 係合爪
53 ロックプレート
9 伸縮ロッド
ロックプレート
53
53 ロックプレート
9 伸縮ロッド
カッタ6
ヘッド
ロックプレートシリンダ54
55 係合爪
(B)
ディスクカッタ
10
ロックプレート53

【図23】


I 第3の従来技術のオーバカッタ
92
91
A
A
92
93
98
(A)
91
93
98
99
95
98a
(B)
91
93
98
93a
92
90
90c
94
93c
97
95
87
96
88
86
98a
(c)

【図１６】

エオーバカッタ装置のディスクカッタロック機構の第５，第６実施例